Appendix J

Data Inputs for Health Impacts Analysis

This appendix provides information on how the non-cancer health benefits resulting from reduction of diesel PM emissions from cargo handling equipment were estimated. It also provides a description on how population-weighted average risk is calculated. The actual data spreadsheets are also provided. However, due to the large size of the spreadsheets, this information is available upon request to the Air Resources Board. The data is available on CD, it can be downloaded from our web site at http://www.arb.ca.gov/cargo, or a hard copy may be viewed at the California Environmental Protection Agency offices at 1001 I Street in Sacramento, California or made available upon request. Inquires should be sent to Ms. Linda Keifer at lkeifer@arb.ca.gov or to the following address:

> Ms. Linda Keifer
> California Air Resources Board
> P.O. Box 2815
> Sacramento, California 95812-2815

Methodology

- Upon the completion of the Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach, we interpolated diesel PM concentrations in each grid cell (161 x 161, or 25921 cells) for a given scenario, such as 2010 with regulation, based on the mass ratio and assumption that the spatial and temporal allocations of cargo handling equipment operation or diesel PM emissions are not changed.

- The number of population in each grid cell was estimated using a Visual Basic program combined with ARCVIEW. The population distribution used in the study is based on the U.S. Census Bureau year 2000 census data.

- Using the methodology peer-reviewed and published in the Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, (PM Staff Report) (ARB, 2002), we calculated the number of annual cases of death and other health effects associated with exposure to the change in PM concentrations modeled for each of the grid cells. The totals over the entire modeling area were then calculated. For each grid cell, each health effect was estimated based on concentration-response functions derived from published epidemiological studies relating changes in ambient concentrations to changes in health endpoints, the population affected, and the baseline incidence rates. The selection of the concentration-response functions was based on the latest epidemiologic literature, as described in the PM Staff Report and in Lloyd and Cackette (Lloyd and Cackette, 2001).

- We estimated that the ports of Los Angeles and Long Beach account for approximately 70 percent of total statewide emissions related to cargo handling equipment. Hence, the statewide impact of the emissions reduced through this

regulation was estimated by dividing the estimated impacts in the modeling domain around the ports of Los Angeles and Long Beach by 0.7.

- The population-weighted average risk is calculated as follows:

$$\overline{R} = \frac{\sum\limits_{i=1}^{n} P_i \times R_i}{\sum\limits_{i=1}^{n} P_i}$$

where P_i is the number of population (all ages) in grid cell i, R_i is the risk in grid cell i, and n is the number of effective grid cells within the modeling receptor domain. Note that if a grid cell lies on the property of the ports or the nearby ocean, the grid cell will be excluded for calculations of population-weighted average risk or impacted areas.

REFERENCES:

(ARB, 2002) Air Resources Board and Office of Environmental Health Hazard Assessment. *Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, Staff Report.* http://www.arb.ca.gov/research/aaqs/std-rs/pm-final/pm-final.htm; May 2002.

(Lloyd and Cackette, 2001) Lloyd, A.C.; Cackette, T.A.; J Air Waste Management Assoc. *Diesel Engines: Environmental Impact and Control*;., 51:809-847. http://www.arb.ca.gov/research/seminars/lloyd/AWMA2001/JAWMADieselCriticalReview.pdf; 2001.